WHAT IS CLAIMED IS:

1. A method of determining relative neuro-muscular response onset values for a plurality of spinal nerves, comprising:

(a) depolarizing a portion of the patient's cauda equina; and

(b) measuring the current intensity level at which a neuro-muscular response to the depolarization of the cauda equina is detected in each of the plurality of spinal nerves.

2. The method of claim 1, wherein depolarizing a portion of the patient's cauda equina comprises:

passing a stimulus pulse between a pair of calibration electrodes.

3. The method of claim 2, wherein,
the pair of calibration electrodes are disposed adjacent the T-L junction.

4. The method of claim 3, wherein,
the pair of calibration electrodes are disposed one above another at the T-L junction.

5. The method of claim 2, wherein, the method of claim 1 is repeatedly performed while the current intensity level of the stimulus pulse is varied over time.

6. The method of claim 5, wherein the current intensity level of the stimulus pulse is varied incrementally.

7. The method of claims 5 or 6, wherein the current intensity level of the stimulus pulse is increased over time.

8. The method of claim 1, wherein the plurality of spinal nerves comprise:
nerves exiting from successive vertebrae.

9. The method of claim 8, wherein measuring the current intensity level at which a neuro-muscular response to the depolarization of the cauda equina is detected in each of the plurality of spinal nerves comprises:

detecting the neuro-muscular responses at a plurality of distally spaced apart myotome locations corresponding to each of the spinal nerves.

10. The method of claim 9, wherein the plurality of distally spaced apart myotome locations are distally spaced apart on the patient's legs.

11. The method of claim 1, wherein measuring the current intensity level at which a neuro-muscular response to the depolarization of the cauda equina is detected in each of the plurality of spinal nerves comprises:

detecting the neuro-muscular responses at a plurality of distally spaced apart peripheral nerve locations corresponding to each of the spinal nerves.

12. The method of claim 1, further comprising:

visually indicating to an operator the intensity level of the neuro-muscular response onset values for each of the plurality of spinal nerves.

13. The method of claim 12, further comprising:

repeating the method of claim 1, thereby measuring sequential sets of neuro-muscular response onset values for each of the plurality of spinal nerves over time; and

simultaneously visually displaying to an operator the measured levels of at least two sets of the neuro-muscular response onset values for each of the plurality of spinal nerves.

14. The method of claim 1, further comprising:

repeating the method of claim 1, thereby measuring sequential sets of neuro-muscular response onset values for each of the plurality of spinal nerves.

15. A method for detecting the presence of a nerve adjacent the distal end of at least one probe, comprising:

(a) determining relative neuro-muscular response onset values for a plurality of spinal nerves;

(b) emitting a stimulus pulse from a probe or surgical tool;

(c) detecting neuro-muscular responses to the stimulus pulse in each of the plurality of spinal nerves; and

(d) concluding that the electrode disposed on the distal end of the at least one probe is positioned adjacent to a first spinal nerve when the neuro-muscular response

detected in the first spinal nerve is detected as a current intensity level less than or equal to the neuro-muscular response onset value of the first spinal nerve.

16. The method of claim 15, wherein the stimulus pulse is emitted from an electrode disposed on the distal end of the at least one probe or surgical tool.

17. The method of claim 15, wherein, determining relative neuro-muscular response onset values for a plurality of spinal nerves is accomplished as set forth in claim 1.

18. The method of claim 15, wherein emitting a stimulus pulse from a probe or surgical tool comprises:

emitting a stimulus pulse from separate left and right probes introduced into the patient on opposite lateral sides of the patient's spine.

19. The method of claim 18, wherein,
the stimulus pulses emitted by the separate left and right probes are multiplexed.

20. The method of claim 7, wherein emitting a stimulus pulse from a probe or surgical tool comprises:

emitting a stimulus pulse from an electrode disposed at a distal end of a cannulated nerve surveillance probe.

21. The method of claim 15, wherein emitting a stimulus pulse from a probe or surgical tool comprises:

emitting a stimulus pulse from an electrode disposed adjacent an inner cutting surface of a rongeur.

22. The method of claim 15, wherein, detecting neuro-muscular responses to the stimulus pulse in each of the plurality of spinal nerves comprises:

detecting the neuro-muscular responses at a plurality of distally spaced apart myotome locations corresponding to each of the spinal nerves.

23. The method of claim 15, further comprising::

repeating the method of claim 15, while the current intensity level of the electrical stimulus pulse is varied over time.

24. The method of claim 23, wherein the current intensity level of the stimulus pulse is varied incrementally.

25. The method of claims 23 or 24, wherein the current intensity level of the stimulus pulse is increased over time.

26. The method of claim 15, wherein, the plurality of spinal nerves comprise: nerves exiting from successive vertebrae.

27. The method of claim 26, wherein measuring the current intensity level at which a neuro-muscular response to the depolarization of the cauda equina is detected in each of the plurality of spinal nerves comprises:

detecting the neuro-muscular responses at a plurality of distally spaced apart myotome locations corresponding to each of the spinal nerves.

28. The method of claim 27, wherein the plurality of distally spaced apart myotome locations are distally spaced apart on the patient's legs.

29. The method of claim 27, wherein measuring the current intensity level at which a neuro-muscular response to the depolarization of the cauda equina is detected in each of the plurality of spinal nerves comprises:

detecting the neuro-muscular responses at a plurality of distally spaced apart peripheral nerve locations corresponding to each of the spinal nerves.

30. The method of claim 15, wherein the method of claim 15 is performed in a repeating sequence.

31. The method of claim 30, wherein the method of claim 15 is repeated automatically.

32. The method of claim 30, wherein the method of claim 15 is repeated under operator control.

33. The method of claim 15, further comprising:

visually indicating to an operator the current intensity of the stimulus pulse which elicits a neuro-muscular response in each of the plurality of spinal nerves.

34. The method of claim 33, further comprising:

repeating the method of claim 15, thereby detecting and measuring sequential sets of neuro-muscular responses for each of the plurality of spinal nerves; and

simultaneously visually displaying to an operator the measured levels of at least two sets of the neuro-muscular responses for each of the plurality of spinal nerves.

35. The method of claim 1, further comprising:

visually indicating to an operator that a spinal nerve is positioned near the distal end of the at least one probe or surgical tool.

36. The method of claim 1, further comprising:

audibly indicating to an operator that a spinal nerve is positioned near the distal end of the at least one probe or surgical tool.

37. The method of claim 36, wherein audibly indicating comprises:

sounding an alarm as the nerve is approached.

38. The method of claim 36, further comprising:

varying the volume of the alarm as the nerve is approached.

39. The method of claim 37, further comprising:

varying the frequency of the alarm as the nerve is approached.

40. The method of claim 15, wherein the at least one probe or surgical tool comprises:

separate left and right probes disposed on opposite lateral sides of the patient's spine.

41. The method of claim 40, wherein,

each of the left and right probes emit a stimulus pulse, with the left and right stimulus pulses being multiplexed.

42. A method of determining the status of a spinal nerve, comprising:

(a) applying a signal with a know current level to the spinal nerve;

(b) measuring a neuro-muscular response of the spinal nerve to the applied signal;

(c) determining whether the neuro-muscular response is greater than a predetermined onset level;

(d) increasing the known current level until the determined neuro-muscular response is greater than the predetermined onset level; and

(e) determining the status of the spinal nerve based on the current level required to generate a neuro-muscular response greater than the predetermined onset level.

43. The method of claim 42, wherein the signal is applied to the spinal nerve by conducting the signal between an electrode passing the epidural space adjacent to the spinal nerve and a return electrode.

44. The method of claim 42, wherein the neuro-muscular response is an electromyography response from a muscle coupled to the spinal nerve.

425. The method of claim 44, wherein the maximum peak-to-peak level of the EMG response is measured and compared to the predetermined onset level.

46 The method of claim 42, wherein the status of the spinal nerve is determined again and compared to the previously determined status.

47. A method of determining the location of a surgical probe relative to a spinal nerve, comprising:

(a) applying a first signal with a know current level to an electrode at a known location relative to the spinal nerve;

(b) measuring a neuro-muscular response of the spinal nerve to the first applied signal;

(c) determining whether the neuro-muscular response is greater than a predetermined onset level;

(d) increasing the known current level of the first applied signal until the determined neuro-muscular response is greater than the predetermined onset level;

(e) determining the status of the spinal nerve based on the current level required to generate a neuro-muscular response greater than the predetermined onset level;

(f) applying a second signal with a know current level to the surgical probe;

(g) measuring a neuro-muscular response of the spinal nerve to the second applied signal;

(h) determining whether the neuro-muscular response to the second applied signal is greater than a predetermined onset level;

(i) increasing the known current level of the second applied signal until the determined neuro-muscular response is greater than the predetermined onset level; and

(j) determining the location of the surgical probe relative to the spinal nerve based on the current level of the second applied signal required to generate a neuro-muscular response greater than the predetermined onset level.

48. The method of claim 47, wherein the first signal is applied to the spinal nerve by conducting the signal between an electrode passing the epidural space adjacent to the spinal nerve and a return electrode.

49. The method of claim 47, wherein the neuro-muscular response is an electromyography response from a muscle coupled to the spinal nerve.

50. The method of claim 49, wherein the maximum peak-to-peak level of the EMG response is measured and compared to the predetermined onset level.